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1980 OCTOBER 24

U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

REPRESENTATION OF GEOGRAPHIC POINT LOCATIONS FOR INFORMATION INTERCHANGE

FEDERAL GENERAL DATA STANDARD
REPRESENTATIONS AND CODES

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U.S. DEPARTMENT OF COMMERCE, Philip M. Klutznick, Secretary

Jordan J. Baruch, Assistant Secretary for Productivity,
Technology and Innovation
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director

Foreword

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James H. Burrows, Director
Institute for Computer Sciences
and Technology

Abstract

This standard specifies a uniform format for representing geographic point location data in digital form for purposes of information interchange among data systems. This standard applies only to the three coordinate systems most widely used in the United States to define the position of a point that may be on, above, or below the earth's surface. These systems include: Latitude and Longitude, Universal Transverse Mercator (UTM), and State Plane Coordinate Systems; all three are mathematically interconvertible and are officially recognized by many mapping and surveying agencies of the Federal and State governments.

KEY WORDS: Coordinate system; elevation; Federal Information Processing Standards Publication; geographic point location; latitude; Latitude and Longitude; longitude; mapping; State Plane Coordinate System; surveying; Universal Transverse Mercator (UTM).

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Federal Information
Processing Standards Publication 70

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ANNOUNCING THE STANDARD FOR

Representation of Geographic Point Locations for Information Interchange

Federal Information Processing Standards Publications are issued by the National Bureau of Standards pursuant to the Federal Property and Administrative Services Act of 1949, as amended, Public Law 89-306 (79 Stat. 1127), Executive Order 11717 (38 FR 12315, dated May 11, 1973) and Part 6 of Title 15 Code of Federal Regulations (CFR).

1. **Name of Standard.** Representation of Geographic Point Locations for Information Interchange.

2. **Category of Standard.** Federal General Data Standard, Representations and Codes.

3. **Explanation.** This standard establishes uniform formats for geographic point location data. Geographic point location refers to the use of a coordinate system to define the position of a point that may be on, above, or below the earth's surface. It provides a means for representing these data in digital form for the purpose of interchanging information among data systems and improving clarity and accuracy of inter-personal communications.

4. **Approving Authority.** Secretary of Commerce.

5. **Maintenance Agency.** U.S. Department of Commerce, National Bureau of Standards (Institute for Computer Sciences and Technology).

6. **Cross Index.** American National Standard X3.61-1978, Representation of Geographic Point Locations for Information Interchange.

7. **Applicability.** This standard is required for use by Federal agencies in representing geographic point locations in the interchange of information among more than one executive department or agency or with the private sector including industry, state, local or other Governments or with the public at large. Use of such standard representations contributes to operational benefits, efficiency and economy.

This standard does not apply to applications covered by non-conforming international agreements established under the aegis of the World Meteorological Organization or the North Atlantic Treaty Organization.

This standard does not address many other geographic coordinate systems and vertical control datums utilized by the Department of Defense in military applications. Such applications are excluded from the provisions of the standard. Also, it is important to note that the standard applies only to uniquely identified locations. It does not necessarily apply to a series of coordinates developed at uniform intervals over a geographic area.

8. **Specifications.** The specifications are affixed. Except as noted here, this standard is materially identical with American National Standard, Representation of Geographic Point Locations for Information Interchange, ANSI

X3.61-1978, copyright 1978 by the American National Standards Institute, 1430 Broadway, New York, NY 10018, reprinted with permission. Differences with ANSI X3.61-1978 are in the addition of Paragraph 2.1.7.1; in the addition of new information in Tables 1, 2, and 3 and in corresponding references in the text; and in several textual modifications made for the purpose of clarity.

9. **Implementation Schedule.** This standard becomes effective April 24, 1981. Federal agencies, based upon their operational requirements, will develop procedures for implementing this standard by their operating units and personnel.

10. **Waiver Procedure.** Heads of agencies may request that provisions of this standard be waived in instances where its use would seriously affect the capability of the agency to perform its operational mission. Such waiver requests will be reviewed for approval by the Secretary of Commerce. Correspondence setting forth the reasons and justification for the waiver should be included in the waiver request.

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Federal Information Processing Standards Publication 70

1980 OCTOBER 24
SPECIFICATIONS FOR

Representation of Geographic Point Locations for Information Interchange

1. Purpose and Scope. Geographic point location refers to the use of a coordinate system to define the position of a point that may be on, above, or below the earth's surface.

This standard is designed to establish uniform formats for geographic point location data. It provides a means for representing these data in digital form for the purpose of interchanging information among data systems and for improving clarity and accuracy in inter-personal communications.

Specifically, this standard is intended to:

(1) provide for uniform representation of geographic point location data;

(2) minimize the amount of human intervention required for communicating geographic point location data;

(3) reduce the time required to format and transmit the elements of geographic point location data.

There are many systems available for indicating point locations. This standard is applicable only to the three most widely used in the United States: Latitude and Longitude, Universal Transverse Mercator (UTM), and State Plane Coordinate Systems. These systems are mathematically interconvertible and are also officially recognized by the many mapping and surveying agencies of the Federal and state governments. This standard does not provide a methodology for use of the three systems covered, nor does it recommend any particular system.

Use of elevation data is not required for defining points on the earth's surface. However, for defining points either above or below the earth's surface or for describing the topography, elevation is required. Therefore, specifications for elevation data are provided as an optional feature of this standard.

Determination of specific geographic point location information is the user's responsibility, as is the accuracy and reliability of the information. This standard does not prescribe file sequences, storage media, programming languages, or other features of information processing to be used in its implementation.

A list of references is provided in Paragraph 4 for more detailed information on the methodology, techniques, and applications of the three systems.

2. Specifications for Geographic Point Location Systems

2.1 Representations for Latitude and Longitude. Latitude and longitude are spherical coordinate representations that show locations on the surface of the earth using the earth's equator and the prime meridian (Greenwich, England) as the respective latitudinal and longitudinal origins.

Although there are applications in which only latitude or longitude need to be recorded, both are usually stated. The sequencing of latitude and longitude then becomes important and is addressed in this standard. Since latitude and longitude are angular quantitites, they are expressed as degrees, minutes and seconds. The standard provides for the representation of latitude and longitude in decimal fractions of degrees, minutes and seconds. The designation of the northern, southern, eastern and western hemispheres is treated also.

2.1.1 **Sequencing of Latitude and Longitude.** Latitude shall be given first - to the left when inscribed with longitude on one line, or above when latitude and longitude are given vertically in relationship to each other. Sequencing shall be from high order to low order (left-to-right direction) in expressing degrees, minutes, and seconds in either latitude or longitude. When a decimal fraction of a degree is used, neither minutes nor seconds may be expressed; similarly, when a decimal fraction of a minute is used, no seconds may be expressed.

2.1.2 **Use of Separators.** Separators are permissible to enhance understanding of the contents of data files. When separators are used, the following guidelines are to be followed.

(1) Separators between latitude and longitude: latitude shall be separated from longitude by either a comma or a blank. No other symbol shall be used as a separator between these items.

(2) Separators between elements within latitude or longitude: no separators shall be used other than the decimal point, as specified in Paragraphs 2.1.3; 2.1.4; and 2.1.5.

It is recognized that degrees, minutes, and seconds are conventionally denoted and separated by using the superscripts ^{0}, ', and ", respectively. For this standard, such designations have not been included as permissible primarily because many data processing machines cannot recognize or reproduce the conventional superscripts.

2.1.3 Representation of Degrees

2.1.3.1 **Latitude.** Degrees of latitude shall be represented by a two-digit decimal number ranging from 00 through 90. For values less than 10, a leading zero shall be given (for example, 01, 05, etc.).

2.1.3.2 **Longitude.** Degrees of longitude shall be represented by a three-digit decimal number ranging from 000 through 180. For values less than 100, leading zero(s) shall be given (for example, 001, 027, etc.).

2.1.3.3 **Latitude and Longitude.** For both latitude and longitude, when a decimal fraction of a degree is specified it shall be separated from the whole number of degrees by a decimal point and expressed numerically to the number of places required by the desired precision. (However, see Paragraph 2.1.7.1 for exception.)

2.1.4 **Representation of Minutes.** For both latitude and longitude, the minutes shall be represented by a two-digit decimal number ranging from 00 through 59. For values less than 10, a leading zero shall be given. When a location is indicated by degrees, minutes, and decimal fractions of a minute, the decimal fraction of a minute shall be separated from the whole number of minutes by a decimal point and expressed numerically to the number of places required by the desired precision.

2.1.5 **Representation of Seconds.** For both latitude and longitude, seconds shall be represented by a two-digit decimal number ranging from 00 through 59. For values less than 10, a leading zero shall be given. When a location is indicated by degrees, minutes, seconds, and decimal fractions of a second, the decimal fraction of a second shall be separated from the whole number of seconds by a decimal point and expressed numerically to the number of places required by the desired precision.

2.1.6 Representation of Hemispheric Information. Latitudes north of the equator shall be specified by an uppercase "N" immediately following the last digit for latitude. Latitudes south of the equator shall be designated by an uppercase "S" immediately following the last digit for latitude. A point on the equator shall be assigned to the northern hemisphere.

Longitudes east of the prime meridian shall be specified by an uppercase "E" immediately following the last digit for longitude. Longitudes west of the prime meridian shall be designated by an uppercase "W" immediately following the last digit for longitude. A point on the prime meridian shall be assigned to the eastern hemisphere. A point on the 180th meridian shall be assigned to the western hemisphere.

2.1.6.1 Alternative 1 for Representation of Hemispheric Information. Latitudes north of the equator may be specified by a plus sign (+) immediately preceding the two digits designating degrees. Latitudes south of the equator may be designated by a minus sign (-) preceding the two digits designating degrees. A point on the equator shall be assigned to the northern hemisphere. Longitudes east of the prime meridian may be specified by a plus sign (+) immediately preceding the three digits designating degrees of longitude. Longitudes west of the meridian may be designated by a minus sign (-) preceding the three digits designating degrees. A point on the prime meridian shall be assigned to the eastern hemisphere. A point on the 180th meridian shall be assigned to the western hemisphere.

2.1.6.2 Alternative 2 for Representation of Hemispheric Information. Many users confine their activities to one quadrant of the earth, and their files contain location data all within that quadrant. For such users, hemisphere codes are unnecessarily space consuming and costly to enter. Therefore, they may elect to use no hemisphere codes within their own system. Where this alternative is used, however, hemisphere information shall be included in correspondence between interested parties.

2.1.7 Precision. A point can be represented at various levels of precision, as illustrated in the numbered examples below. (In all except the first two examples, hemisphere is shown using N and W, with the understanding that + and - could have been used; separation is shown by using a comma, with the understanding that a space (blank) could have been used instead of a comma.)

(1) Degrees and decimal fractions of a degree:

40.20361N,075.00417W or +40.20361,-075.00417

(2) Degrees and minutes:

4012N,07500W or +4012,-07500

(3) Degrees, minutes and decimal fractions of a minute:

4012.22N,07500.25W

(4) Degrees, minutes and seconds:

401213N,0750015W

(5) Degrees, minutes, seconds and decimal fractions of a second:

401213.1N,0750015.1W

For longitude at the equator, and for latitude anywhere on the earth, the location of a point to the level of precision of 0.01 foot (0.003 meter) on the face of the earth corresponds approximately to angular values (on a great circle) of 0.000000028 degree, 0.0000017 minute or 0.00010 second.

Using these values, the preceding examples of latitude and longitude at this level of precision are as follows:

(1) Degrees and decimal fractions of a degree:

40.20361498N,075.00417321W

(3) Degrees, minutes and decimal fractions of a minute:

4012.221312N,07500.251341W

(5) Degrees, minutes, seconds and decimal fractions of a second:

401213.1132N,0750015.1214W

The number of decimal places to which any representation of latitude or longitude is carried must, of course, depend on the user's requirements, the accuracy of measuring instruments, and similar factors.

2.1.7.1 Alternate Representation of Precision. In the latitude and longitude system, the precision of the data to be exchanged may be included in the data name, as, for example, "latitude, deciseconds," "longitude, deciseconds," or "geographic coordinates, deciseconds." When this option is used, a decimal point separator (as specified in Paragraph 2.1.2) is not required between the whole and fractional units.

2.1.8 Elevation (Optional). See Paragraph 3 for formatting of elevation data.

2.2 Representations for Universal Transverse Mercator Grid System (UTM). The Universal Transverse Mercator Grid System provides rectangular coordinates that may be used to indicate locations of points on the surface of the earth. UTM involves linear measurements, and the unit of measure is the meter. A point is located by specifying a hemispheric indicator, a zone number, an easting value, and a northing value.

UTM is designed for world use between 80° south latitude and 84° north latitude. The globe is divided into narrow zones, 6° of longitude in width, starting at the 180° meridian of longitude and progressing eastward. The zones are numbered 1 through 60. Each zone has, as its east and west limits, a meridian of longitude. Each zone also has a central meridian passing through the center of the zone. The location of any point within a zone is given in relation to the central meridian within that zone and the equator. The system zone yields positive values for the identification of a point on the earth's surface by first assigning numeric values to the equator and to the central meridian. Then, a point's north-south location is obtained by either adding or subtracting the point's distance north or south of the equator. Similarly, a point's east-west location is obtained by either adding or subtracting the point's distance east or west of the central meridian.

A value of 500,000 meters is assigned to the central meridian of each zone in order to avoid negative numbers at the west edge of the zone. The values increase from west to east. For north-south values in the northern hemisphere, the equator is assigned 0 meters, and the numbers increase toward the north pole. In the southern hemisphere, the equator is assigned 10,000,000 meters, and the numbers decrease toward the south pole.

On a map, appropriate values for the easting and northing of a point are determined relative to labeled grid lines. A point on the equator is assigned a value of zero for its northing and is treated as if it were in the northern hemisphere. A point on a boundary meridian is assigned the zone number for the zone to the east of the point.

2.2.1 Sequencing of UTM and Hemisphere Codes. The first item of information shall be a code to indicate the hemisphere in which the point is located. A plus sign (+) shall be used to indicate the northern hemisphere, and a minus sign (-) to indicate the southern hemisphere. The second item of information shall be the zone number indicating the 6° longitudinal band in which the point is located (01, 02, ...60). The third item of information shall be the easting in meters. The last item of information shall be the northing in meters.

2.2.2 Precision. In order to provide the precision equivalent to that used with the Latitude and Longitude and State Plane Coordinate Systems, UTM may be recorded to three decimal places.

2.2.3 Use of Separators. Separators are permissible to enhance understanding of the contents of data files. When separators are used, the following guidelines shall be followed.

(1) Separators between hemisphere code and zone number: the hemisphere code shall not be separated from the zone number.

(2) Separators between zone number and easting value: the zone number shall be separated from the easting value by a comma or a blank.

(3) Separators between elements of UTM measurements: the easting value shall be separated from the northing value by a comma or a blank.

(4) Separators for precision: for both easting and northing values, when a decimal fraction of a meter is specified, it shall be separated from the unit value by a decimal point followed by as many as three digits to provide the necessary precision. The following are examples of the use of UTM positional information:

+18,520381.516,3684572.632   -18,520381.516,6315427.368

The above examples illustrate two points within the same zone that are equidistant from the equator: one in the northern hemisphere and one in the southern hemisphere.

2.2.4 Representation of Numbers of Varying Magnitude. Except in special applications covering a small area of the earth's surface, leading zeros are required for use in numbers that are less than the permissible maximum. For example, if a northing of less than 1,000,000 is required, leading zeros should be inserted to preserve spatial integrity.

The following are examples of UTM geographic point location codes.

Alaska:

+05,426453.473,6596814.917

Point on the equator in Colombia, South America:

+18,593681.510,0000000.000

A point one-millimeter south of the one designated immediately above:

-18,593681.510,9999999.999

2.2.5 Elevation (Optional). See Paragraph 3 for formatting elevation data which is required when defining a point either above or below the land surface.

2.3 Representations for State Plane Coordinate Systems. The State Plane Coordinate Systems (SPCSs) are designed to define the locations of points within a geographic grid system. They were used first in the nineteenth century; the first formal use was in 1932. There are now one or more State Plane Coordinate Systems in use in each of the 50 United States, as well as in the Commonwealth of Puerto Rico, the U.S. Virgin Islands, American Samoa, and Guam. The District of Columbia is included with the State of Maryland. State Plane Coordinate Systems represent separate, distinct systems for the 54 political jurisdictions involved, as opposed to the universally-applicable Latitude and Longitude (see Paragraph 2.1) and Universal Transverse Mercator (UTM) Systems (see Paragraph 2.2).

Nine states, Puerto Rico, American Samoa, and Guam are covered individually by one State Plane Coordinate System or zone. The nine states are: Connecticut; Delaware; Maryland; New Hampshire; New Jersey; North Carolina; Rhode Island; Tennessee; and Vermont. The remaining forty-one states and the Virgin Islands are covered individually by from two to ten SPCSs. These systems fall into four general categories, based upon the conformal mapping projection methods utilized in the political jurisdiction:

(1) the Lambert Projection;

(2) the Transverse Mercator (TM) Projection (not to be confused with the UTM);

(3) a combination of Lambert and TM Projections in New York and Florida; and

(4) a combination of Lambert, TM, and an (unique) oblique projection in Alaska.

A zone may extend to the state boundaries of a political jurisdiction and to county boundaries where these are contiguous with state boundaries.

Further, a zone may be defined in one of three ways. In each of these three methods, an arbitrary point of origin in latitude and longitude is one element of the definition of the zone. The other element of definition varies with the conformal mapping projection system used in the zone:

(1) Lambert Projection - two "standard parallels" of latitude bounding the zone;

(2) Transverse Mercator Projection - one central north-south (longitudinal) meridian bisecting the zone at an arbitrary east-west point;

(3) Alaskan oblique projection - as defined in detailed Alaska State Plane Coordinate System specifications, referenced in this standard.

The arbitrary point of origin for each zone is typically located outside the geographic area it covers. This is designed to meet the objective that no coordinate may have a negative value.

2.3.1 Jurisdictional Representation. This representation identifies the 50 States that comprise the United States, as well as the Commonwealth of Puerto Rico, the U.S. Virgin Islands, American Samoa, and Guam. There are two alternative methods for representation of jurisdictions: a two-character alphabetic code and a two-digit numeric code. Both are specified in Federal Information Processing Standard, States and Outlying Areas of the United States (including the District of Columbia), FIPS PUB 5-1 (ANSI X3.38-1972).

2.3.2 Zone Representation. This representation uniquely identifies each of the zones or State Plane Coordinate Systems found within a jurisdiction as represented in accordance with Paragraph 2.3.1. Two methods are provided.

2.3.2.1 One or Two Character Representation. The first method for zone or SPCS representation provides for a left-justified code of one or two characters which may be alphabetic or numeric. This code will accommodate all zones in the 54 jurisdictions using SPCSs; it is mnemonic and is based on standard, common nomenclature used in the jurisdictions to indicate specific zones. Table 1 shows this code; a "b" represents a blank (space) in an individual code entry. Table 2 is a summary listing of proposed representations for the SPCSs and their zones within all jurisdictions.

2.3.2.2 Four Character Representation. In this representation, each of the zones or SPCSs in each jurisdiction is uniquely identified by a four-character numeric code. Table 3 is a summary listing of the alternate representations for the SPCSs and zone codes within all jurisdictions.

2.3.3 Sequencing of X Coordinates and Y Coordinates. The X coordinate, which is the east-west location indicator, shall precede (be to the left of, when on one line, and be above, when shown vertically) the Y coordinate, which is the north- south location indicator.

2.3.4 Use of Separators. Separators are permissible to enhance understanding of the contents of data files. When separators are used, the following guidelines shall be followed.

When a choice is indicated between a pair of separator symbols, one symbol alone shall be chosen, so that the same symbol is used as a separator between every field in a record where a separator is used. This is intended to facilitate data interchange. The items described in Paragraphs 2.3.1, 2.3.2, 2.3.5, and 2.3.6 shall be used in left-to-right sequence.

(1) Separator between jurisdictional representation (2.3.1) and zone representation (2.3.2): a single comma or blank shall be used.

(2) Separator between zone representation (2.3.2) and X coordinate representation (2.3.5): Same as (1) above.

(3) Separator between X coordinate representation (2.3.5) and Y coordinate representation (2.3.6): Same as (1) above.

2.3.5 X Coordinate Representation. Three methods are available for the designation of this east-west location indicator: (1) the Lambert Projection, (2) the Transverse Mercator Projection, and (3) the oblique projection used in Alaska.

For each of these three methods, the precision requirements shall be the same as those for the Latitude and Longitude (Paragraph 2.1) and Universal Transverse Mercator (Paragraph 2.2) Systems. This shall be at the maximum level of precision of 1/100 of a foot (0.01 foot), or 3 millimeters, at mean sea-level datum.

The notation for an X coordinate in an existing SPCS may be expressed by a number of the general magnitude of NNNNNNN.NN. This will suffice for a range of X of not less than 0.01 foot and not more than 9,999,999.99 feet, and is considered to be appropriate for this standard.

As many digits as are required may be used for purposes of internal processing and storage of X coordinate data. For interchange purposes, the following conventions shall apply to the X coordinate representation.

(1) Leading zeros shall be used in numbers with fewer digits than the permissible maximum.

(2) Where a decimal fraction is used, it shall be one or two positions in length, as required (for example, .15, .1).

(3) Where a decimal fraction is not used, the X coordinate shall be of the range of not less than 0000001 foot, and not more than 9999999 feet.

Therefore, for interchange purposes, the maximum sized coordinate shall consist of seven high-order decimal digits, that is, NNNNNNN.NN.

2.3.6 **Y Coordinate Representation.** There are three methods for the designation of the north-south location indicator: (1) the Lambert Projection, (2) the Transverse Mercator Projection, and (3) the oblique Alaska zone projection.

The requirements for this coordinate shall be the same as those set forth in Paragraph 2.3.5 for X coordinate representation.

2.3.7 **Z Coordinate Representation.** This coordinate is utilized in some applications, although it is not known to be part of an official SPCS. It is a coordinate for elevation. See Paragraph 3 for formatting of elevation data.

2.3.8 **Conversion Computations.** Publications containing projection tables for the State Plane Coordinate Systems are available to assist with conversion computations. These are listed in Table 4.

3. Specifications for Elevation Data (Optional)

3.1 **General.** Elevation of a point, as used in this standard, is defined as the distance in meters either above or below a reference surface. In the United States, this reference surface is the National Geodetic Vertical Datum of 1929, which approximates mean sea level.

If elevation data are presented, they should follow the geographic coordinate data.

3.2 Representation of Elevation

3.2.1 **Precision.** Representation of elevation may or may not contain a decimal point. If a representation for an elevation contains a decimal point, the number of places after the decimal point should reflect the inherent precision of the measurement. The number of digits in an integer does not necessarily imply precision.

3.2.2 **Elevation Data.** All elevation measurements below the reference datum shall be designated by a minus sign (-) preceding the number. Measurements at or above the reference datum may be either without a sign or may be designated by a plus sign (+), but usage should be consistent throughout a set of data.

3.2.3 **Sequencing of Data.** When present, the elevation data shall follow and be separated from the geographic coordinate data by either a comma or a blank, whichever is used within the geographic coordinate data.

3.2.4 **Unit of Measurement.** The use of feet as the unit of measurement is optional. Where this option is used, the unit of measurement shall be specified by the interested parties.

4. Selected References

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U.S. Department of Commerce, Bureau of the Census. Geographic Base File System; Correction-Update-Extension: Procedural Manual for the Review and Correction of the Addresses Range Edit (ADDEDIT) Listing (GEO-MT 502); January 1973.

U.S. Department of Commerce, National Technical Information Service. Geoplanning Research Program Systems Conceptualization, Task 2 Report. Des Moines, Iowa; April 1973.

Table 1
Zone Representation Code

Code(s)	SPCS/Zone Represented	Jurisdiction(s) Concerned
bb	A single zone, where only one zone in a state	Nine states, which have only one SPCS/zone (see Table 2 for names), American Samoa, Guam
SH	Offshore	Louisiana
Mb	Mainland	Massachusetts (one of two zones)
Ib	Island	Massachusetts (one of two zones)
CM	Central (TM)	Michigan (see Table 2)
Lb	Long Island	New York (one of four zones)
NC	North Central	Texas (one of five zones)
SC	South Central	Texas (one of five zones)
EC	East Central	Wyoming (one of four zones)
WC	West Central	Wyoming (one of four zones)
Eb	East	Many (see Table 2)
Sb	South	Many (see Table 2)
Wb	West	Many (see Table 2)
Nb	North	Many (see Table 2)
Cb	Central	Many (see Table 2)
01-10	Numerically designated zone	For the following states, as shown: Alaska - 01 through 10 California - 01 through 07 Hawaii - 01 through 05 Wyoming - 01 through 04
Z1	Zone 1	Puerto Rico and Virgin Islands (St. John, St. Thomas)
SX	Zone 2	Virgin Islands (St. Croix)

NOTES:

(1) Wyoming is shown with two designations; it is shown on Table 2 in the same fashion. It is the only state with both alphabetic and numeric official zone designations.

(2) The codes indicated in Sections 2.3.1 and 2.3.2 shall be applied to the zones indicated in Table 2. For Wyoming only, the numeric zone designations or the alphabetic zone designations are expected to be used separately, without intermixing of codes.

(3) The Commonwealth of Puerto Rico and the Territory of the U.S. Virgin Islands share one zone, except for the Island of St. Croix which is in a second, separate, zone.

Table 2
Jurisdictions and State Plane Coordinate Systems

			Zone Identifications Used for Each SPCS in Jurisdiction																	
Jurisdictions	Alpha. Code	Num. Code	E	S	W	N	C	C M	E C	S C	W C	N C	M	I	Z 1	S X	L	S H	Blank (one)	Numeric
Alabama	AL	01	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alaska	AK	02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01 through 10
Arizona	AZ	04	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Arkansas	AR	05	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
California	CA	06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01 through 07
Colorado	CO	08	-	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Connecticut	CT	09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Delaware	DE	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
District of Columbia*																				
Florida	FL	12	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	GA	13	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawaii	HI	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01 through 05
Idaho	ID	16	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	IL	17	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indiana	IN	18	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iowa	IA	19	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kansas	KS	20	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kentucky	KY	21	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Louisiana	LA	22	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	X	-	-
Maine	ME	23	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maryland	MD	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Massachusetts	MA	25	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-
Michigan	MI	26	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Minnesota	MN	27	-	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Mississippi	MS	28	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	MO	29	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Montana	MT	30	-	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Nebraska	NE	31	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nevada	NV	32	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	HN	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
New Jersey	NJ	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
New Mexico	NM	35	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
New York	NY	36	X	-	X	-	X	-	-	-	-	-	-	-	-	-	X	-	-	-
North Carolina	NC	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
North Dakota	ND	38	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	OH	39	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oklahoma	OK	40	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oregon	OR	41	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pennsylvania	PA	42	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhode Island	RI	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
South Carolina	SC	45	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	SD	46	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tennessee	TN	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Texas	TX	48	-	X	-	X	X	-	-	X	-	X	-	-	-	-	-	-	-	-
Utah	UT	49	-	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Vermont	VT	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Virginia	VA	51	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Washington	WA	53	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Virginia	WV	54	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wisconsin	WI	55	-	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyoming	WY	56	X	-	X	-	-	-	X	-	X	-	-	-	-	-	-	-	-	01 through 04
American Samoa	AQ	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Guam	GQ	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Puerto Rico	RQ	72	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	**
Virgin Islands	VQ	78	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	**

* See Maryland.

** See Note 3, Table 1.

Table 3
Jurisdictions, State Plane Coordinate Systems, and Alternate Zone Representations

Jurisdiction Zone Name or Number	Alpha. Code	Num. Code	Zone Code
Alabama	AL	01	
East			0101
West			0102
Alaska	AK	02	
01 through 10			5001 through 5010
Arizona	AZ	04	
East			0201
Central			0202
West			0203
Arkansas	AR	05	
North			0301
South			0302
California	CA	06	
01 through 07			0401 through 0407
Colorado	CO	08	
North			0501
Central			0502
South			0503
Connecticut	CT	09	0600
Delaware	DE	10	0700
District of Columbia*			
Florida	FL	12	
East			0901
West			0902
North			0903
Georgia	GA	13	
East			1001
West			1002
Hawaii	HI	15	
01 through 05			5101 through 5105
Idaho	ID	16	
East			1101
Central			1102
West			1103
Illinois	IL	17	
East			1201
West			1202
Indiana	IN	18	
East			1301
West			1302
Iowa	IA	19	
North			1401
South			1402
Kansas	KS	20	
North			1501
South			1502
Kentucky	KY	21	
North			1601
South			1602
Louisiana	LA	22	
North			1701
South			1702
Offshore			1703
Maine	ME	23	
East			1801
West			1802
Maryland	MD	24	1900
Massachusetts	MA	25	
Mainland			2001
Island			2002

* See Maryland.

Table 3
Jurisdictions, State Plane Coordinate Systems, and Alternate Zone Representations

Jurisdiction Zone Name or Number	Alpha. Code	Num. Code	Zone Code
Michigan	MI	26	
East			2101
Central (Transverse Mercator)			2102
West			2103
North			2111
Central (Lambert)			2112
South			2113
Minnesota	MN	27	
North			2201
Central			2202
South			2203
Mississippi	MS	28	
East			2301
West			2302
Missouri	MO	29	
East			2401
Central			2402
West			2403
Montana	MT	30	
North			2501
Central			2502
South			2503
Nebraska	NE	31	
North			2601
South			2602
Nevada	NV	32	
East			2701
Central			2702
West			2703
New Hampshire	NH	33	2800
New Jersey	NJ	34	2900
New Mexico	NM	35	
East			3001
Central			3002
West			3003
New York	NY	36	
East			3101
Central			3102
West			3103
Long Island			3104
North Carolina	NC	37	3200
North Dakota	ND	38	
North			3301
South			3302
Ohio	OH	39	
North			3401
South			3402
Oklahoma	OK	40	
North			3501
South			3502
Oregon	OR	41	
North			3601
South			3602
Pennsylvania	PA	42	
North			3701
South			3702
Rhode Island	RI	44	3800
South Carolina	SC	45	
North			3901
South			3902

Table 3
Jurisdictions, State Plane Coordinate Systems,
and Alternate Zone Representations

Jurisdiction Zone Name or Number	Alpha. Code	Num. Code	Zone Code
South Dakota	SD	46	
North			4001
South			4002
Tennessee	TN	47	4100
Texas	TX	48	
North			4201
North Central			4202
Central			4203
South Central			4204
South			4205
Utah	UT	49	
North			4301
Central			4302
South			4303
Vermont	VT	50	4400
Virginia	VA	51	
North			4501
South			4502
Washington	WA	53	
North			4601
South			4602
West Virginia	WV	54	
North			4701
South			4702
Wisconsin	WI	55	
North			4801
Central			4802
South			4803
Wyoming	WY	56	
East (01)			4901
East Central (02)			4902
West Central (03)			4903
West (04)			4904
Puerto Rico	RQ	72	5201
Virgin Islands	VQ	78	
St. John, St. Thomas			5201
St. Croix			5202
American Samoa	AQ	60	5300
Guam	GQ	66	5400

Table 4

List of Publications of the National Ocean Survey,
(U.S. Department of Commerce)
Necessary for Conversion Computations
on the State Plane Coordinate Systems*

Special Publication Number	Publication	
235	The State-Coordinate Systems (A Manual for Surveyors)	
304	Plane Coordinate Projection Tables	Alabama
65-1	Plane Coordinate Intersection Tables	Alaska
257	Plane Coordinate Projection Tables	Arizona
289	" " " "	Arkansas
253	" " " "	California
276	" " " "	Colorado
266	" " " "	Connecticut
305	" " " "	Delaware
255	" " " "	Florida
322	" " " "	Georgia
302	" " " "	Hawaiian Islands
306	" " " "	Idaho
303	" " " "	Illinois
259	" " " "	Indiana
284	" " " "	Iowa
285	" " " "	Kansas
290	" " " "	Kentucky
291	" " " "	Louisiana (Revised)
256	" " " "	Maine
292**	" " " "	Maryland
274	" " " "	Massachusetts
65-3	" " " "	Michigan
264	" " " "	Minnesota
321	" " " "	Mississippi
319	" " " "	Missouri
261	" " " "	Montana
286	" " " "	Nebraska
318	" " " "	Nevada
317	" " " "	New Hampshire
316	" " " "	New Jersey
324	" " " "	New Mexico
323	" " " "	New York
272	" " " "	North Carolina
262	" " " "	North Dakota
269	" " " "	Ohio
287	" " " "	Oklahoma
270	" " " "	Oregon
267	" " " "	Pennsylvania
G-59	" " " "	Philippine Islands
65-2	" " " "	Puerto Rico and Virgin Islands
315	" " " "	Rhode Island
273	" " " "	South Carolina
263	" " " "	South Dakota
268	" " " "	Tennessee
252	" " " "	Texas
277	" " " "	Utah
314	" " " "	Vermont
293	" " " "	Virginia
271	" " " "	Washington
275	" " " "	West Virginia
288	" " " "	Wisconsin
258	" " " "	Wyoming

* Available from the Government Printing Office, Washington, D.C. 20401.

** Includes District of Columbia.

NBS TECHNICAL PUBLICATIONS

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